Physical Activity Guidelines for Improving Diabetes, Heart Disease, and Obesity

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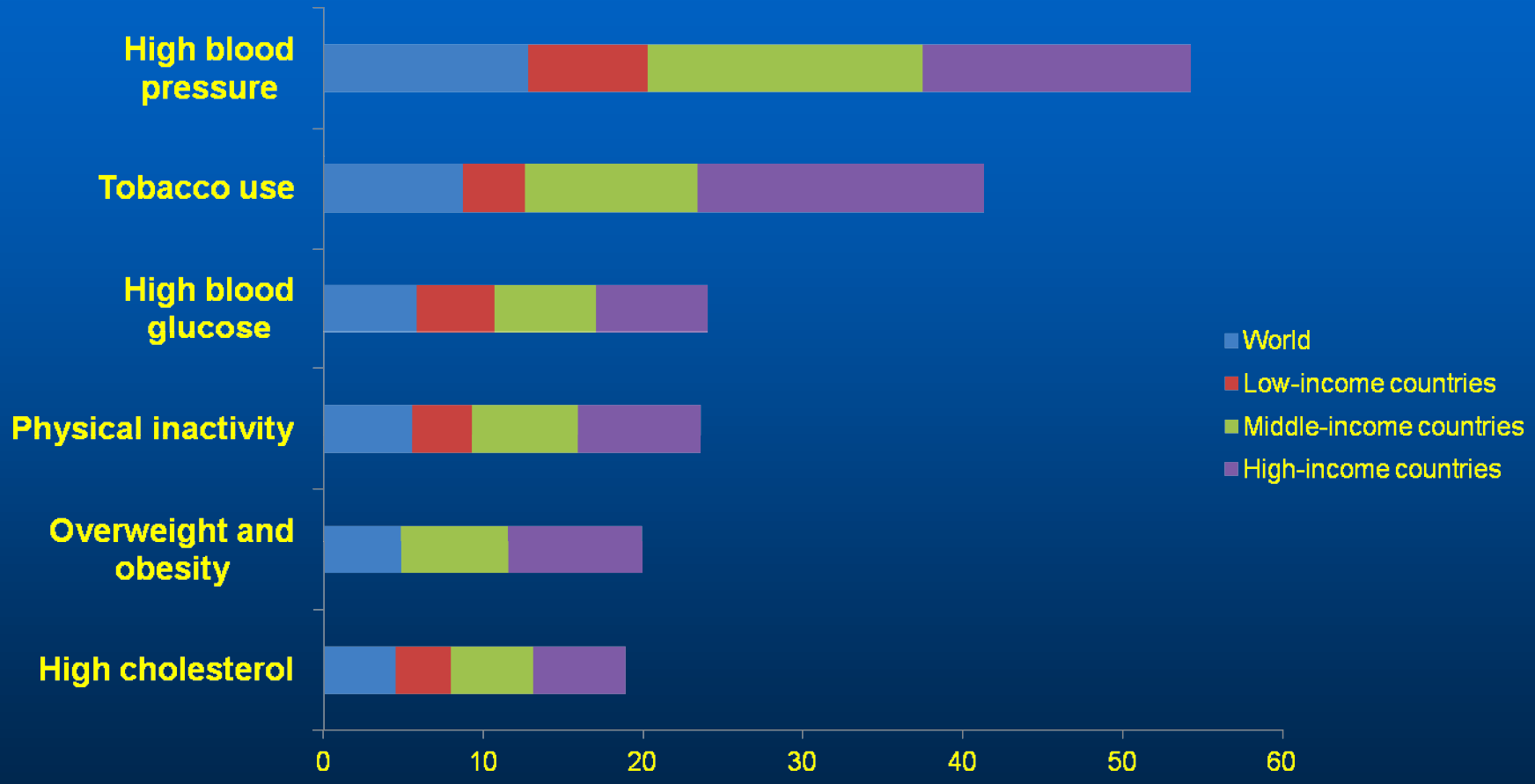
Question

- Rank the following exposures by the number of deaths caused worldwide.
  - Tobacco use
  - Physical inactivity
  - High blood pressure
  - Obesity
  - High blood glucose

Ranking of selected risk factors: 6 leading causes of death by income group, estimates for 2004

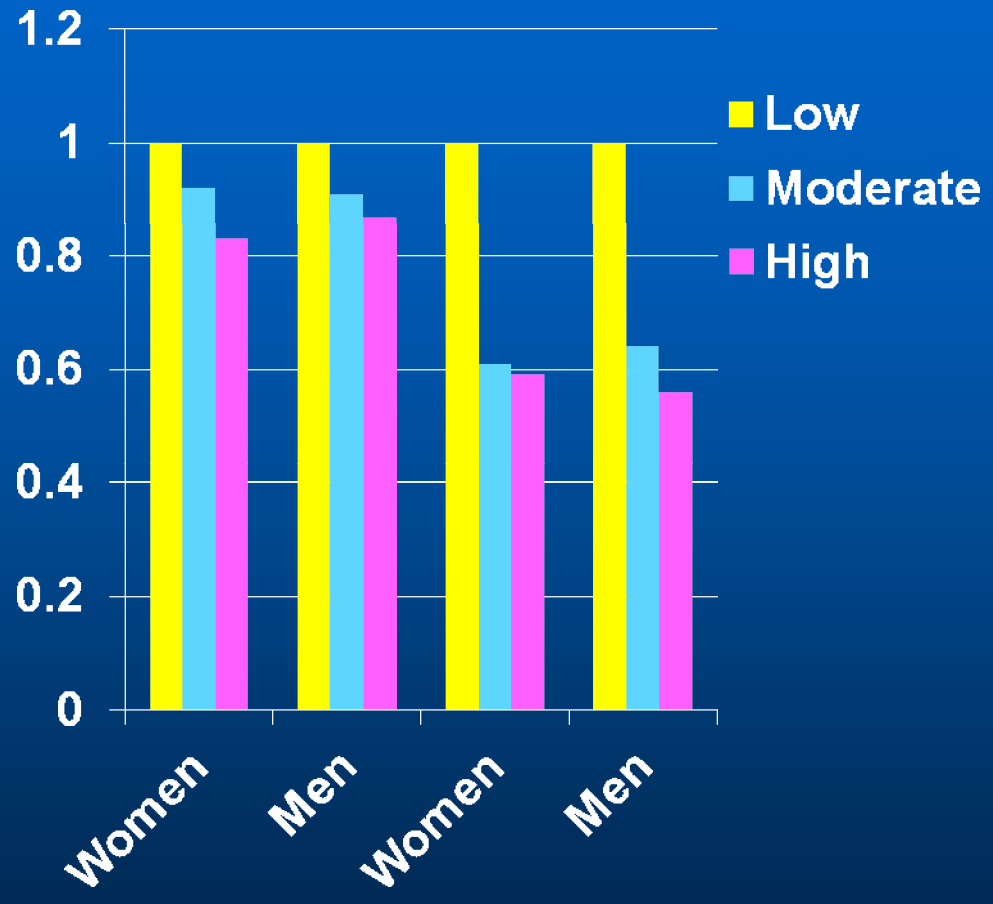


Percentage of total (total: 1.53 billion)

World Health Organization.
http://www.who.int/healthinfo/global_burden_disease/global_health_risks/en/index.htm

Self-reported Physical Activity Underestimates the True Effect

- 31,818 men and 10,555 women
- 1492 deaths in men during average follow-up of 14.6 years, and 230 deaths in women during average follow-up of 12.8 years
- PA mortality trends not significant after adj for CRF
- CRF trends significant after adj for PA



Lee DC, et al. *BJSM;* pub online April 23, 2010

Outline

- Physical activity, fitness, and health
  - Fitness, fatness and health outcomes
- Exercise Is Medicine
- Physical activity recommendations
  - DHHS 2008 PA Guidelines
  - WHO physical activity recommendations
  - ACSM/ADA position statement
- What to do
  - Getting people to be active
  - Dealing with quackery
- Summary and Conclusions

Aerobics Center Longitudinal Study

Design of the ACLS

1970 More than 80,000 patients 2005

Cooper Clinic examinations--including history and physical exam, clinical tests, body composition, EBT, and CRF

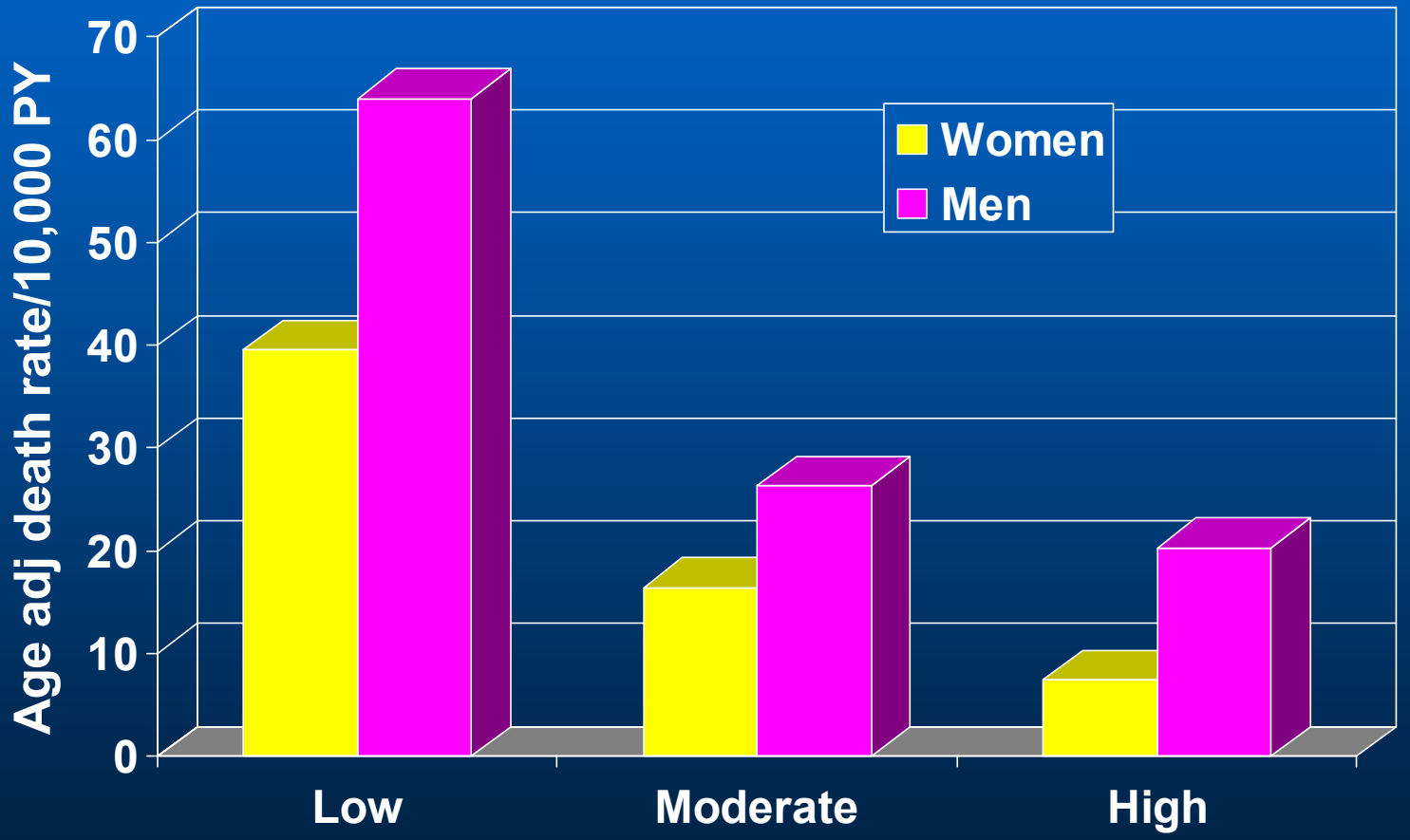
Mortality surveillance to 2003

More than 4000 deaths

1982 ‘86 ‘90 ‘95 ’99 ‘04

Mail-back surveys for case finding and monitoring habits and other characteristics

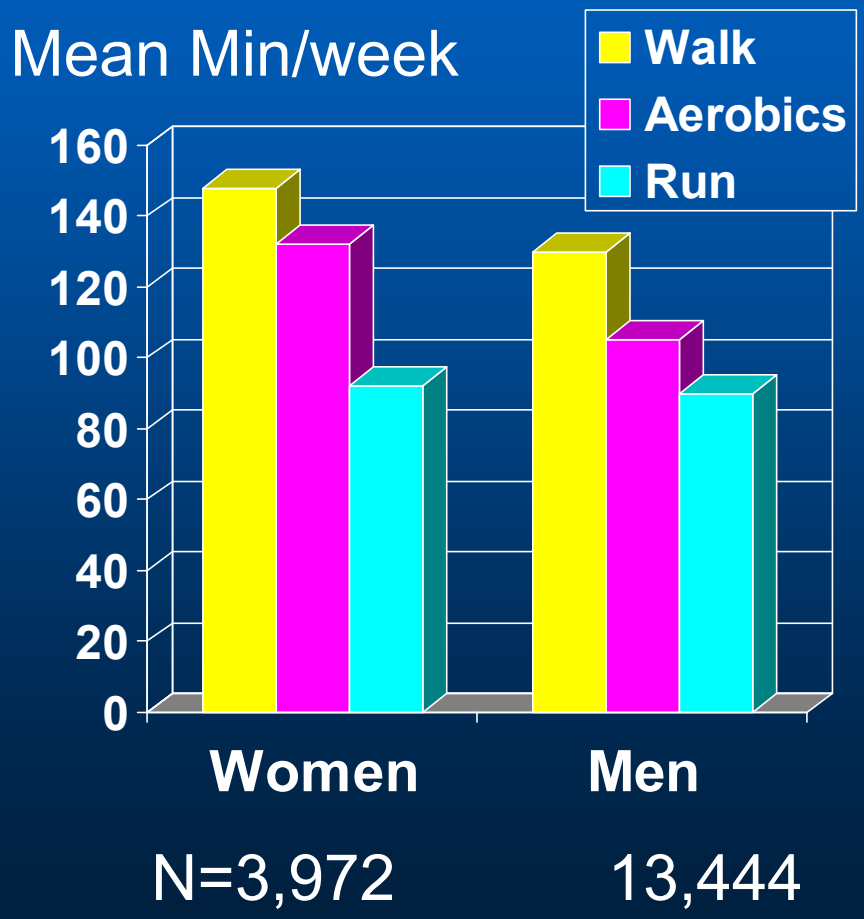
All-Cause Death Rates by CRF Categories—3120 Women and 10 224 Men—ACLS



Blair SN. *JAMA* 1989

Amount of Specific Physical Activities for Moderately Fit Women and Men

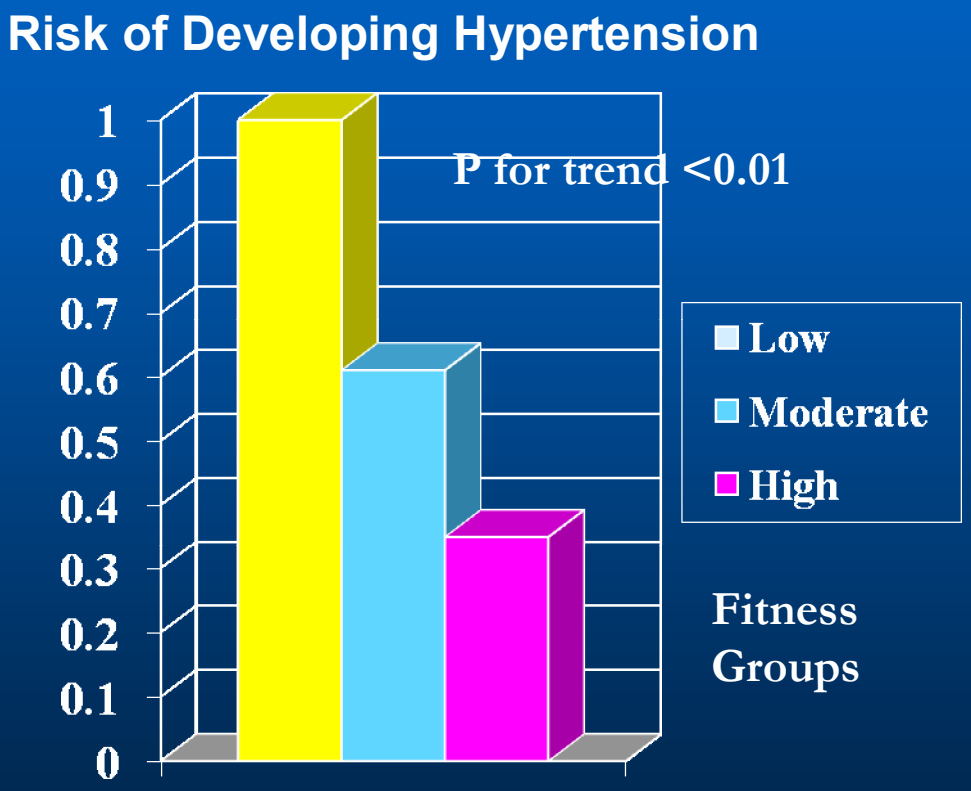
- Detailed physical activity assessments in women and men who also completed a maximal exercise test
- Average min/week for the moderately fit who only reported each specific activity



Stofan JR et al. *AJPH* 1998; 88:1807

CRF and Risk of Incident Hypertension, ACLS Women

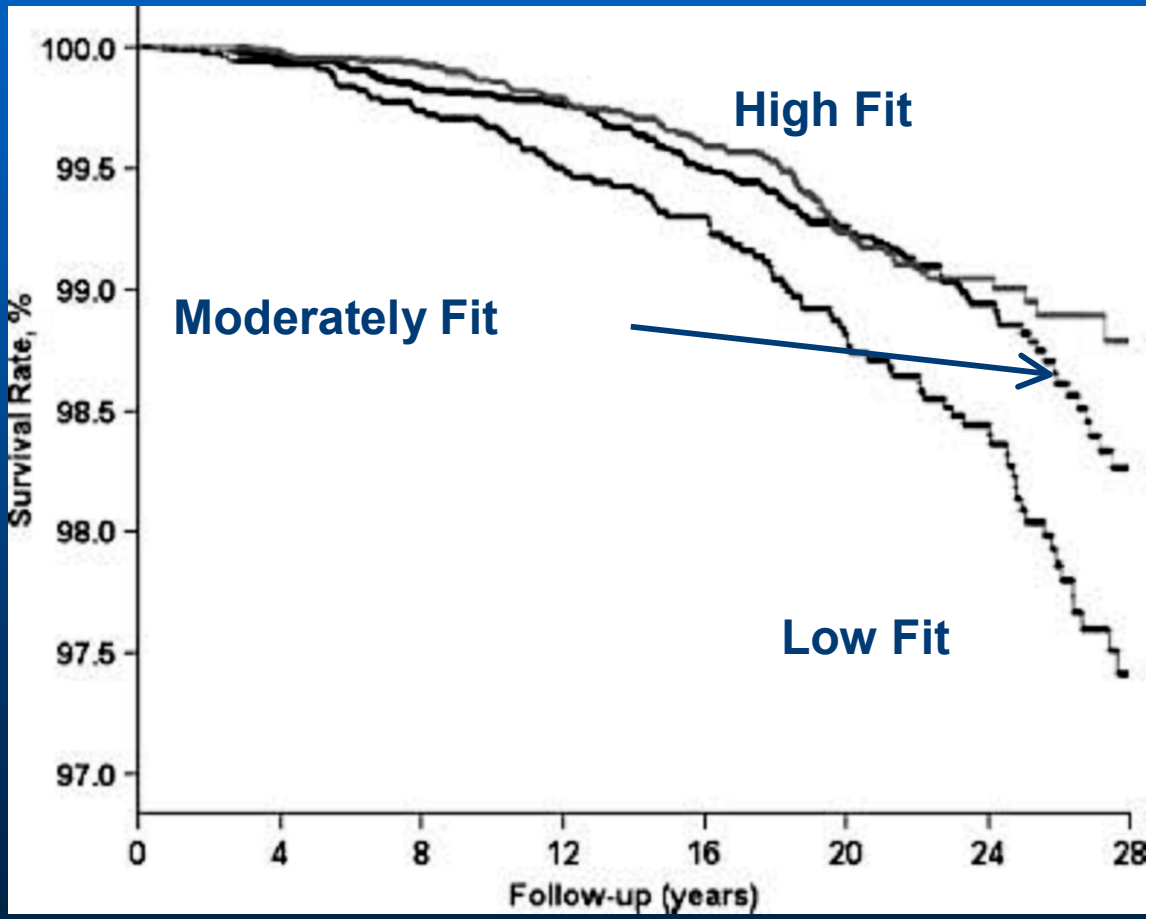
- 4,884 healthy women examined at the Cooper Clinic, 1970-1998
- 157 women developed hypertension during average follow-up of 5 years
- Risk adjusted for age, exam year, alcohol intake, smoking, BP, family history of hypertension, waist girth, glucose, & triglycerides



Barlow CE et al. *Am J Epidemiol* 2006; 163:142-50

CRF and Digestive System Cancer Mortality

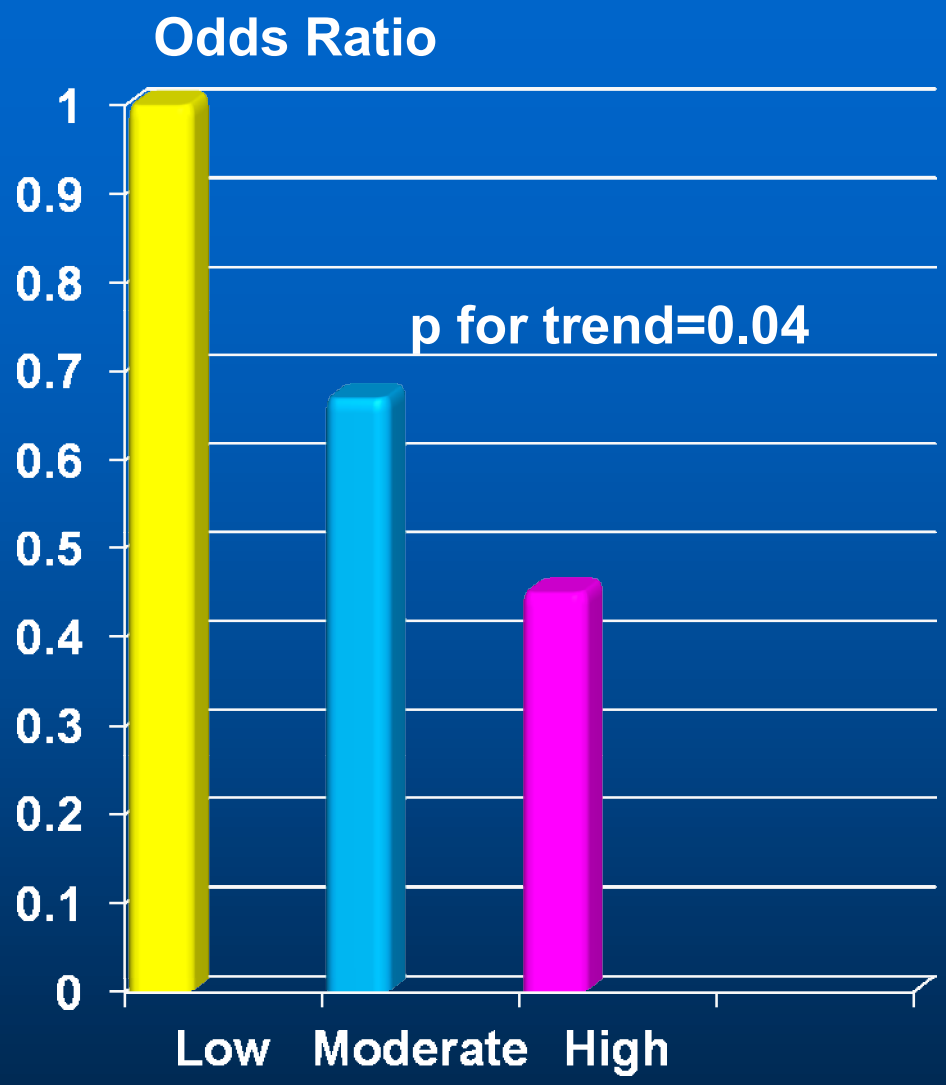
- 38,801 men, ages 20-88 years
- 283 digestive system cancer deaths in 17 years of follow-up
- CRF was inversely associated with death after adjustment for age, examination year, body mass index, smoking, drinking, family history of cancer, personal history of diabetes
- Fit men had lower risk of colon, colorectal, and liver cancer deaths



Peel JB et al. *Cancer Epidemiol Biomarkers Prev* 2009; 18:1111

CRF and Breast Cancer Mortality

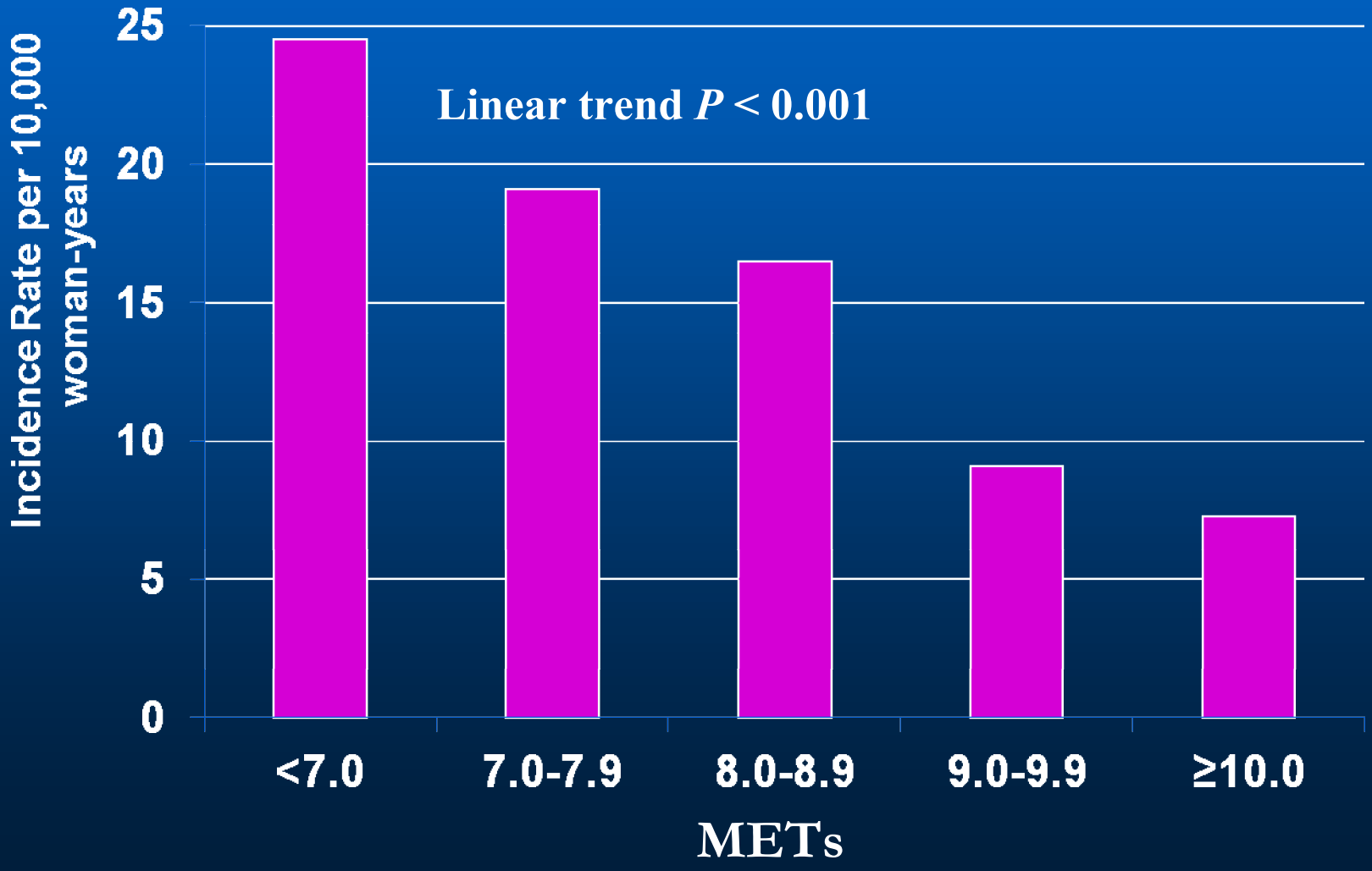
- 14,551 women, ages 20-83 years
- Completed exam 1970-2001
- Followed for breast cancer mortality to 12/31/2003
- 68 breast cancer deaths in average follow-up of 16 years
- Odds ration adjusted for age, BMI, smoking, alcohol intake, abnormal ECT, health status, family history, & hormone use



Sui X et al. *MSSE* 2009; 41:742

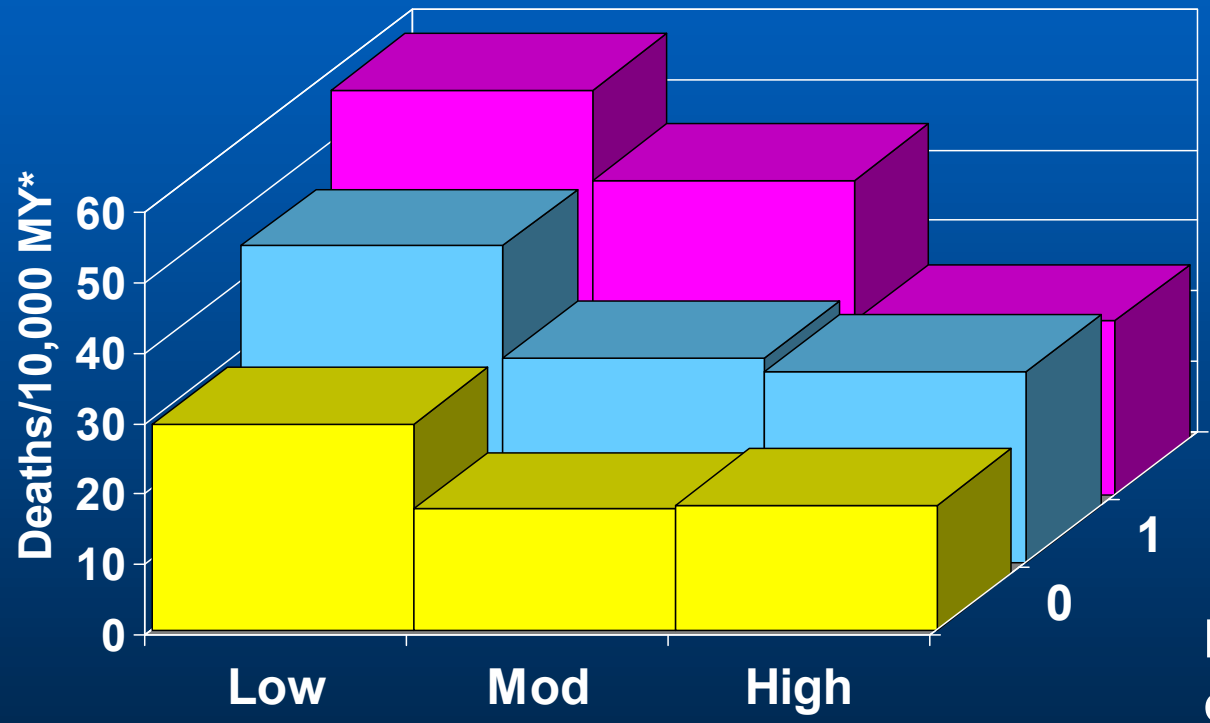
Age-adjusted Incidence Rates of Type 2 Diabetes By CRF Levels Quantified by 1-MET Increment, ACLS, 6249 Women

Sui X, Hooker SP, Lee I-M, …Blair SN. *Diabetes Care* 2008; 31:550-5



Exercise Is Medicine

Cardiorespiratory Fitness, Risk Factors and All-Cause Mortality, Men, ACLS

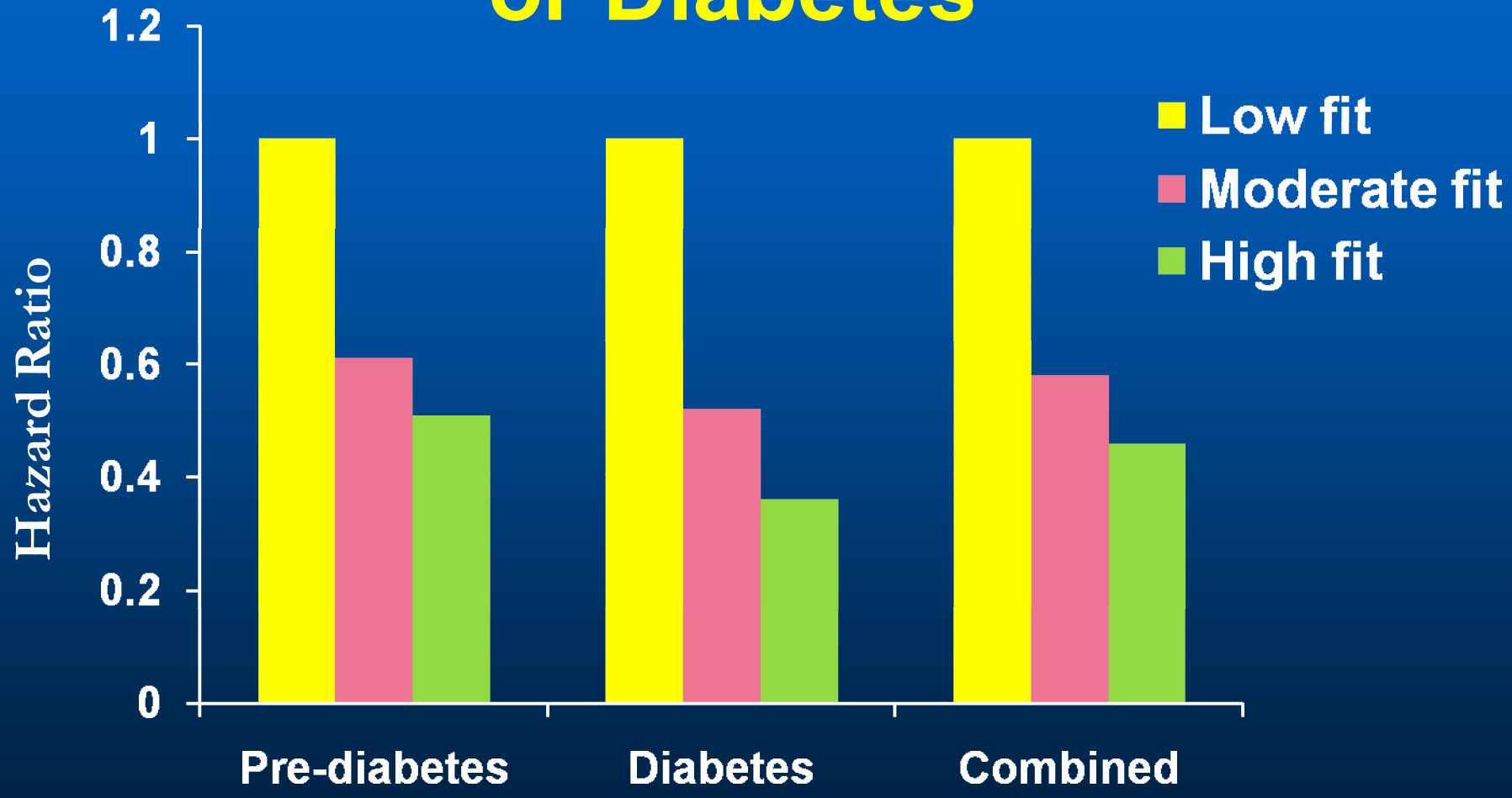


Risk Factors
current smoking
SBP ≥140 mmHg
Chol ≥240 mg/dl

*Adjusted for age, exam year, and other risk factors

Blair SN et al. *JAMA* 1996; 276:205-10

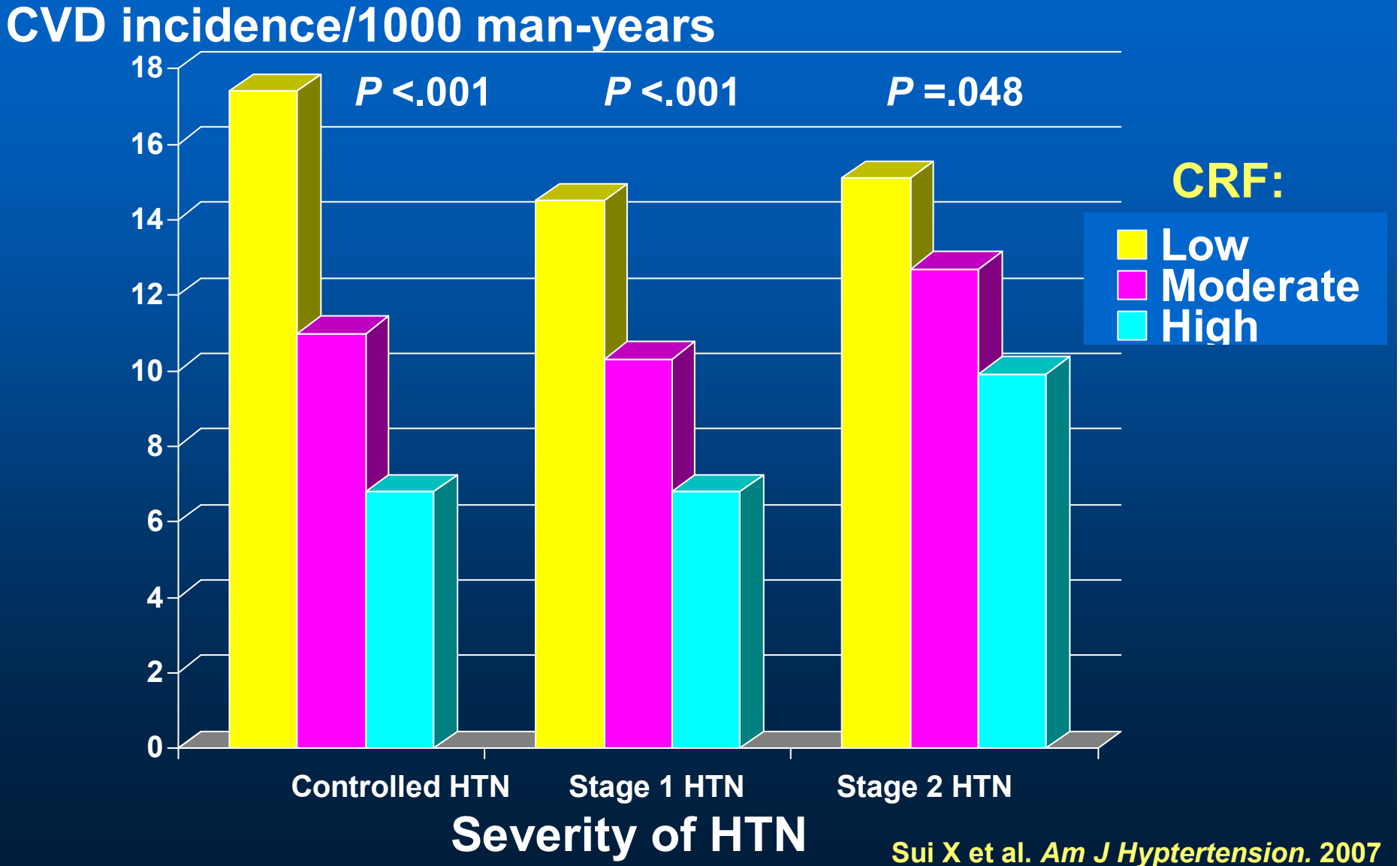
Fitness and All-cause Mortality in 21,663 ACLS Men with Pre-diabetes or Diabetes



*Adj for Age, exam year, smoking, alcohol, FPG, Hx CA, & BMI)

Thompson AM et al. *DiabetesCare*.2008.Apr;31(4):764-9

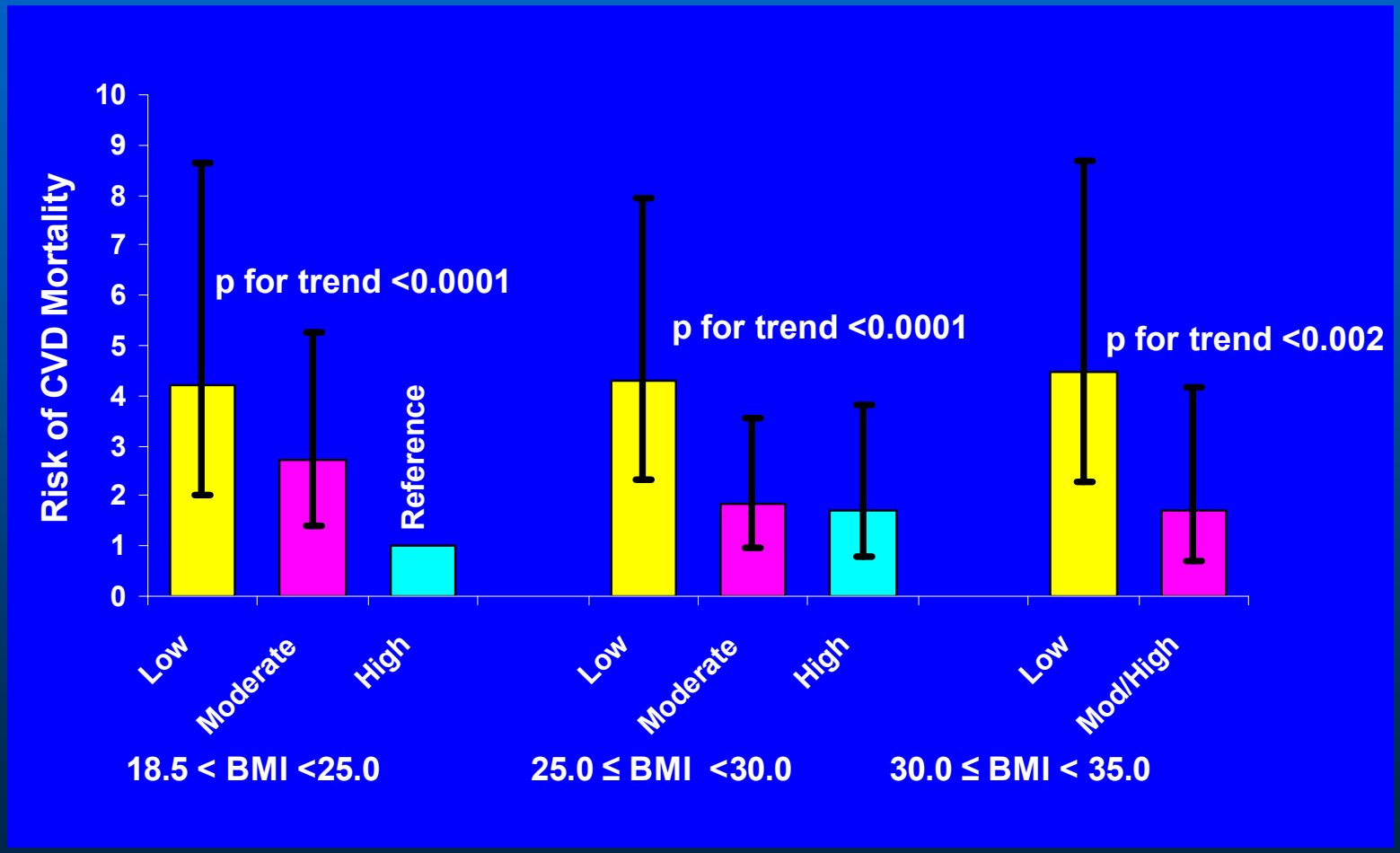
Age and exam year adjusted rates of total CVD events by levels of CRF and severity of HTN in 8147 hypertensive men



Sui X et al. *Am J Hyptertension.* 2007

Fitness, Fatness, and Health

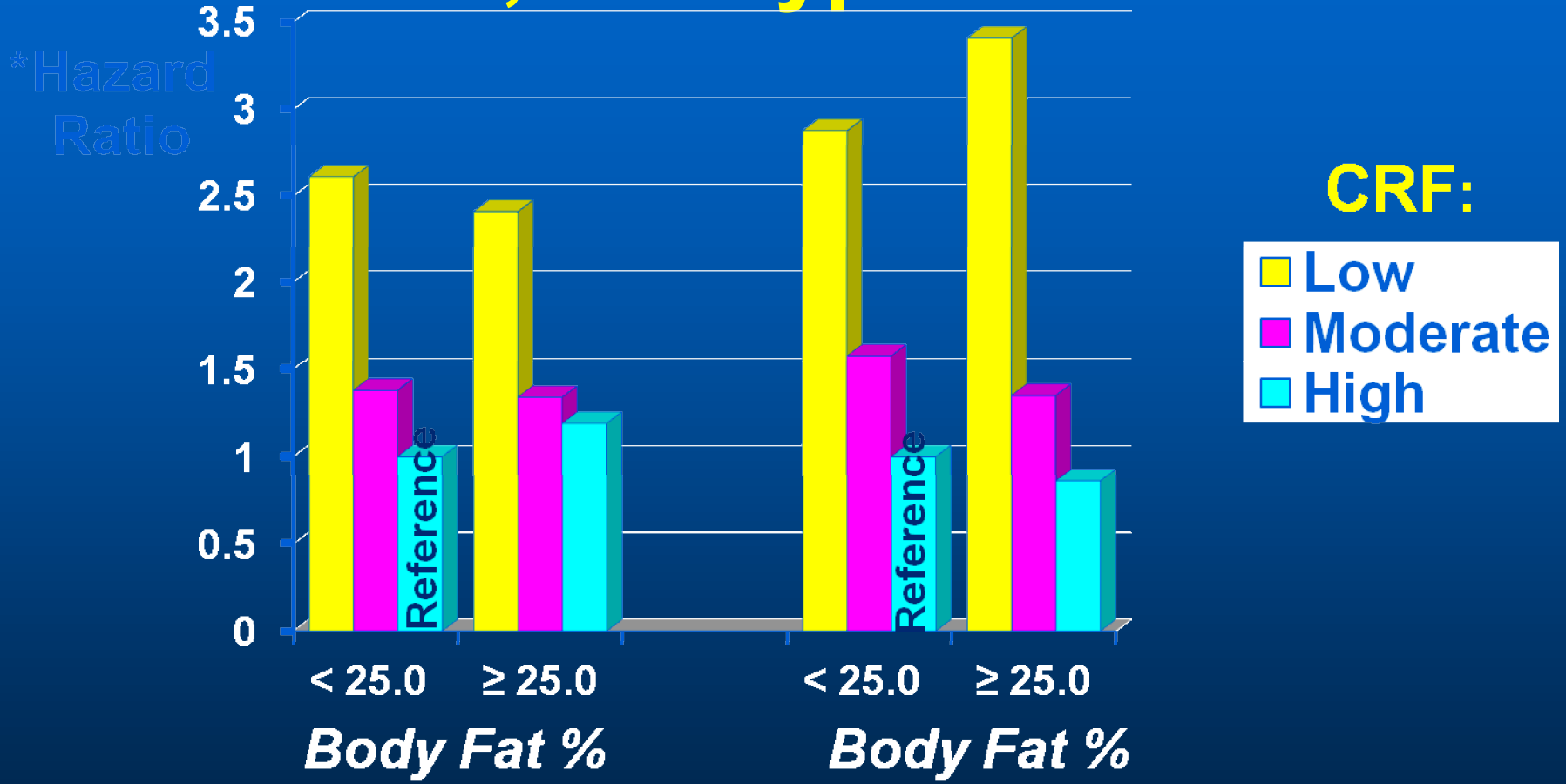
CVD Mortality Risk* by Fitness and BMI Categories, 2316 Men with Diabetes, 179 CVD Deaths



*Adj for age and examination year

Church TS et al. *Arch Int Med* 2005; 165:2114

CRF and %Body Fat on Mortality Risk in 13,155 Hypertensive Men

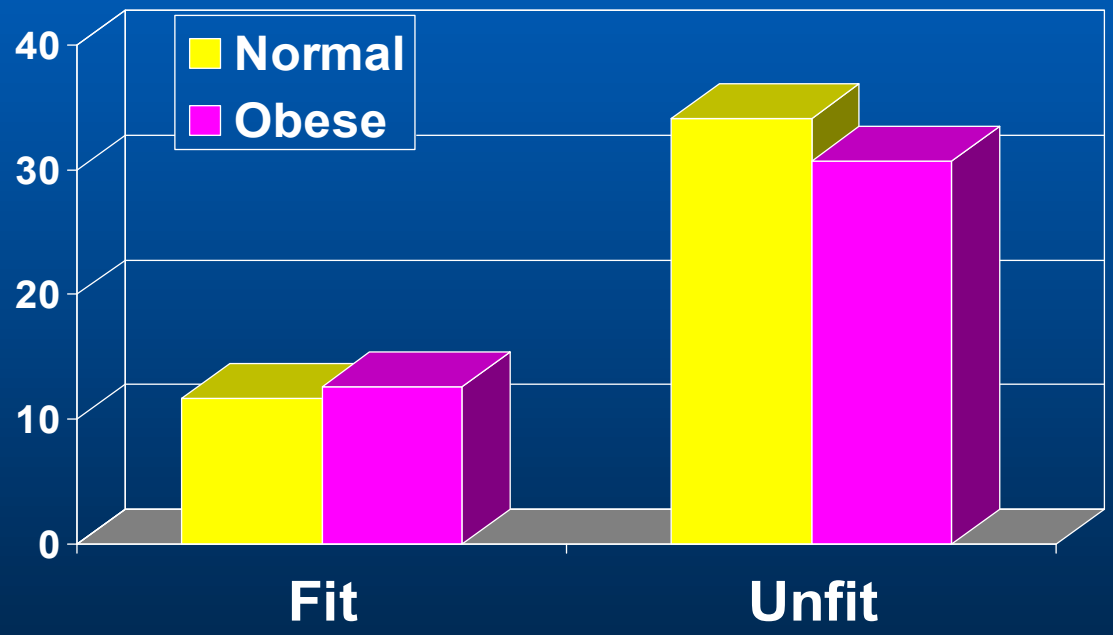


* Adjusted for age, exam year, physically inactive, family history, smoking, alcohol, resting SBP and DBP, & diabetes and hypercholesterolemia

McAuley et al. Am J Hypertension 2009; 22: 1062-69

Joint Associations of CRF and % Body Fat with All-cause Mortality, ACLS Adults 60+

Death rate/1,000 person-years



	Fit		Unfit	
Deaths	151	190	29	72

Rates adjusted for age, sex and exam year

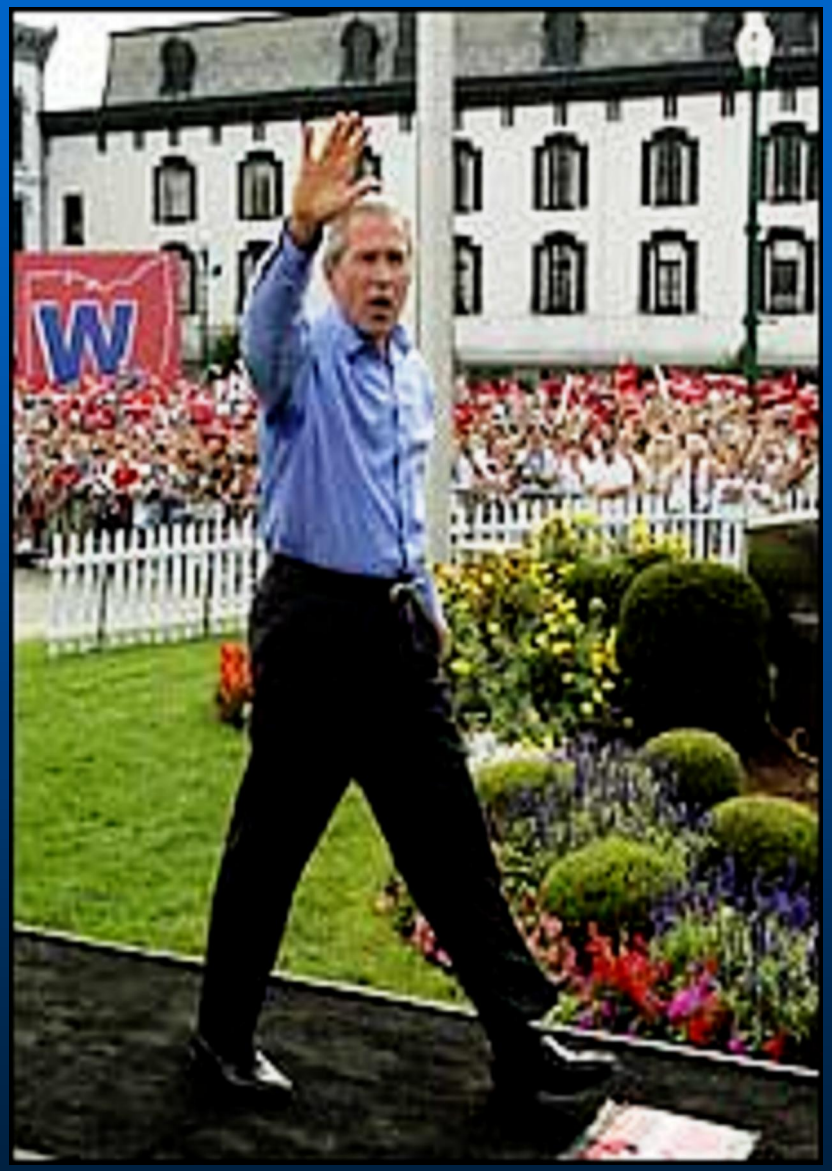
Sui M et al. *JAMA* 2007; 298:2507-16

Definitions for adults
Body mass index (BMI) – weight/height [2]

- Underweight: BMI < 18.5
- Normal weight: BMI 18.5-<25
- Overweight*: BMI 25-<30
- Obesity: BMI 30 +

	BMI 18.5	BMI 25	BMI 30
162 cm (64 in)	49 kg (107 lbs)	66 kg (145 lbs)	79 kg (174 lbs)
178 cm (70 in)	59 kg (129 lbs)	79 kg (174 lbs)	95 kg (209 lbs)

* WHO defines overweight as BMI 25+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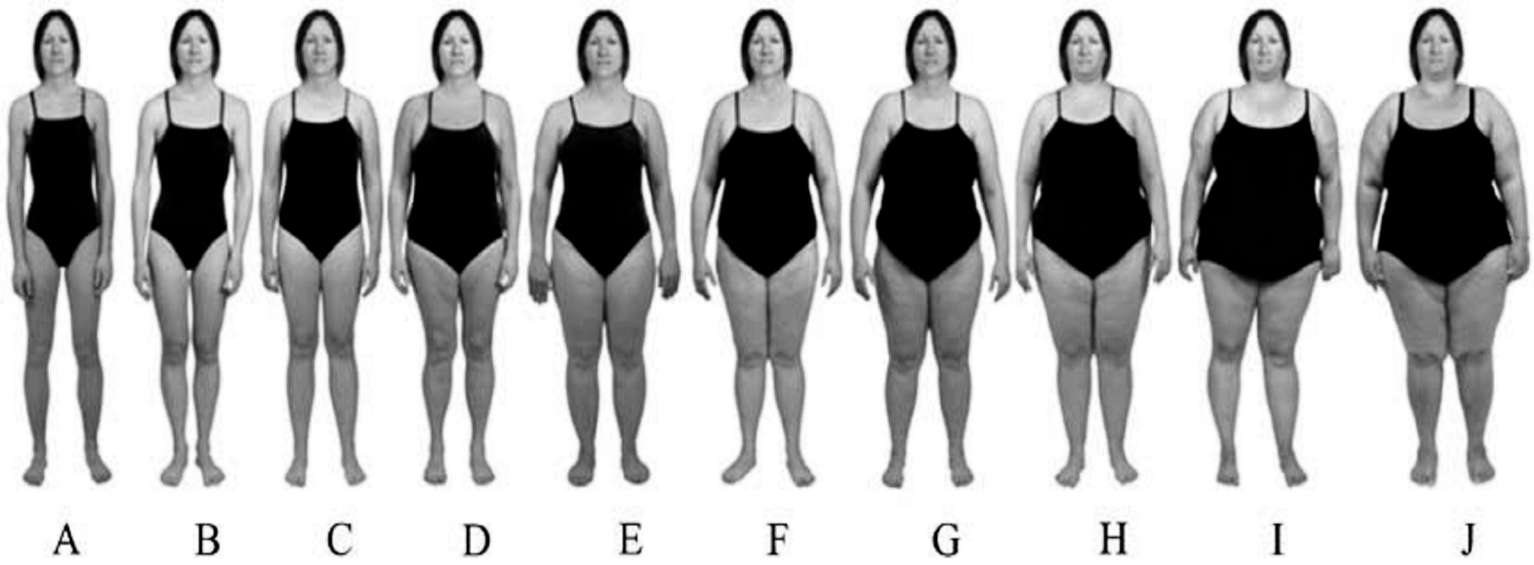
(AP PHOTO)

SOURCE: Harris 2008 Int J Obesity

Courtesy of Katherine Flegal



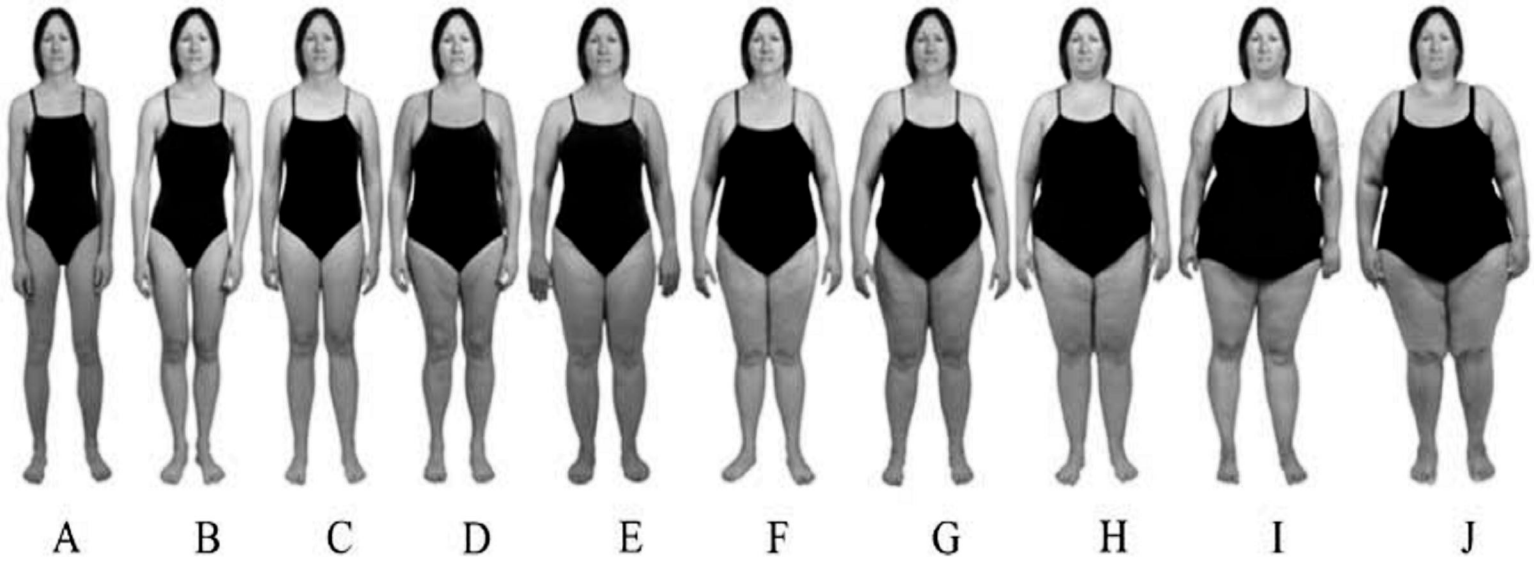
SOURCE: Harris 2008 Int J Obesity

Courtesy of Katherine Flegal

Weight by Measured BMI	Under weight	Normal weight	Over weight	Class I Obesity	Class II Obesity	Class III Obesity
Perception of Weight by Respondents	Underwt.	Normal weight		Overweight	Obese	
		Healthy				

SOURCE: Harris 2008 Int J Obesity

Courtesy of Katherine Flegal



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SOURCE: Harris 2008 Int J Obesity

Courtesy of Katherine Flegal

Physical Activity Recommendations/Guidelines

2008 Physical Activity Guidelines for Americans

At-A-Glance

http://www.health.gov/paguidelines

U.S. Department of Health and Human Services

4 Key Adult *Guidelines*

- Avoid inactivity
- Substantial health benefits from medium amounts of aerobic activity
- More health benefits from high amounts of aerobic activity
- Muscle-strengthening activities provide additional health benefits

Physical Activity Guidelines

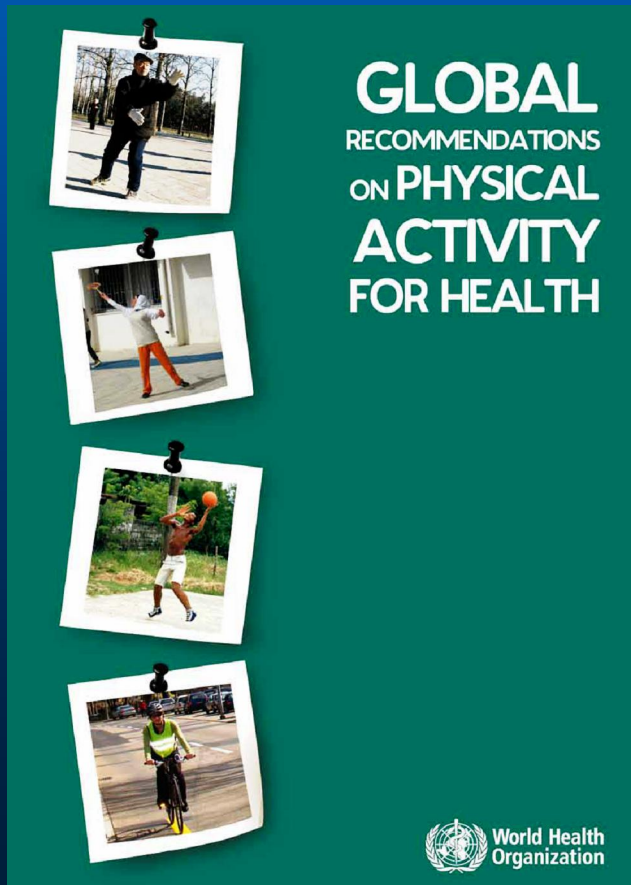
- For all individuals, some activity is better than none. More is better.
- For fitness benefits, aerobic activity should be episodes of at least 10 minutes.
- Physical activity is safe for almost everyone. The health benefits of physical activity far outweigh the risks.

Key Guidelines – Adults (ages 18–64)

- Minimum levels a week
  - 2 hours and 30 minutes (150 minutes) moderate-intensity aerobic activity; or
  - 1 hour and 15 minutes (75 minutes) vigorous-intensity aerobic activity; or
  - An equal combination
- "Aerobic activity should be performed
  - in episodes of at least 10 minutes,
  - And preferably, it should be spread throughout the week."

WHO PA Recommendation

- Released by WHO in December 2010
- PA recommendations
  - 5-17 yr—60 min MVPA/day, vigorous intensity, including muscle and bone strengthening 3 X week
  - 18-64 yr—each week accumulate in bouts of at least 10 min, 150 min moderate intensity, 75 min vigorous intensity, or combination of both; and resistance training 2 X week
  - 65 yr & older—same as 18-64 yr, those with poor mobility should also do balance exercises, and take health conditions into account



Joint ADA & ACSM *Guidelines*

Colberg et al. Diab Care 2010; 33:c147-167.

- **PA is a key element in the prevention & treatment of T2D**
  - **PA enhances BG control by ↑ glucose uptake in active muscles, ↑ fat oxidation**
- **Most Americans with T2D, or who are at the highest risk for developing it, do not engage in regular PA**
  - **Their rate of participation is well below the national average**

Prevention of T2D

- 2.5hrs/wk of moderate PA prevents or delays T2D in high-risk populations
  - 30 minutes of brisk walking 5d/wk reduces the risk by 30%
  - When PA is combined w/ modest weight loss, risk is reduced by up to 58%
- Youth Prevention recommendations
  - 60min/d of MVPA 5d/wk
  - Limit sedentary time (e.g., media use)
    - < 60min/d

Treatment Goals in T2D

- PA is necessary to achieve and maintain optimal BG, lipid and BP levels
- PA is essential in preventing or delaying the chronic complications of T2D
- Lifestyle improvements are paramount
- Medications should augment, not replace changes in PA & diet

Pre-PA Recommendations

- Before undertaking PA more intense than brisk walking, sedentary persons with T2D likely benefit from an evaluation by a physician
- Electrocardiogram exercise stress testing for asymptomatic individuals at low risk of CAD is not recommended, but may be indicated for higher risk

Recommended PA Participation

- Aerobic training
  - Frequency: Minimum of 3 days/wk
    - No more than 2 consecutive days off between bouts of PA
  - Intensity: Moderate to vigorous
    - 40-60% or more of VO_2max
    - e.g., brisk walking
  - Duration: Minimum of 150 min/wk

Recommended PA Participation

- **Progressive resistance training**
  - **Frequency: Minimum of 2-3 days/wk**
    - **Non-consecutive days**
  - **Intensity: Moderate to Vigorous**
    - **50-80% of 1-RM**
  - **Duration: 5-10 exercises**
    - **All major muscle groups**
    - **Begin w/ 10-15 repetitions, progress to a weight that only allows 8-10 repetitions per set**





Recommended PA Participation

- Inclusion of both aerobic and resistance training is recommended
- Combined training is of greater benefit than either form of PA alone
  - Milder forms of PA (e.g., Tai Chi, Yoga) may benefit BG control, but are not supported conclusively
- Increase daily unstructured PA
  - Short walks, other daily movement
  - Decrease sedentary time

What Should We Do?

Help people become and stay more physically active

Behavioral Approaches to Physical Activity Interventions

- Theoretical foundations
  - Social Learning Theory
  - Stages of Change Model
  - Environmental/Ecological Model
- Methods
  - Problem solving
  - Self-monitoring
  - Goal setting
  - Social support
  - Cognitive restructuring
  - Incremental changes
  - Manipulating the environment

Track Record of Lifestyle PA Interventions

- Successfully implemented in many different populations and settings
  - Men and women of all ages
  - African-American men and women, Hispanic women
  - Prostate cancer survivors
  - Worksites, YMCA's, public heath departments, recreation facilities, senior centers, churches

Lessons Learned from Physical Activity Intervention Studies

- Individuals who use cognitive and behavioral strategies are more likely to be active at 24 months than individuals who do not use these strategies
- Approximately 25-30% of initially sedentary persons who participate in Active Living will be meeting consensus public health guidelines for physical activity at 24 months

What Should We Not Do?

Continue with Quackery and Uncritical, Unfounded, or Unusual Comments about Obesity and Health

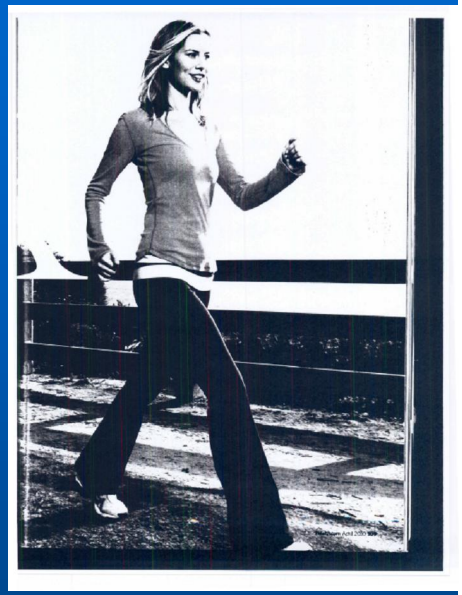
Which causes more deaths in the U.S.—smoking or obesity?

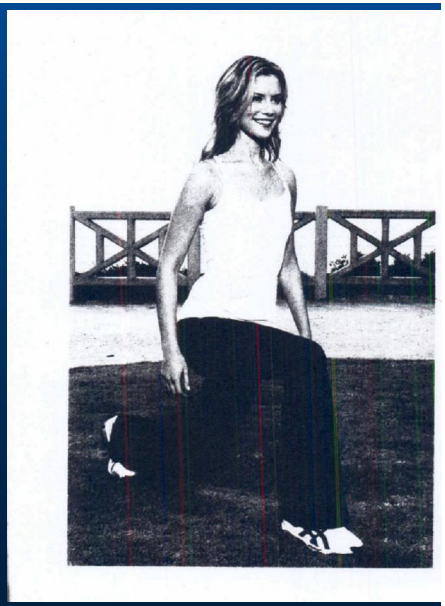
- ~40% of U.S. adults think obesity causes at least as many deaths as does smoking
- ~20% of U.S. adults think obesity causes more deaths than smoking
- The truth
  - Smoking causes ~440,000 deaths/year
  - Obesity causes ~110,000 deaths/year


THE #1 SECRET TO WEIGHT-LOSS SUCCESS! p.41
Health
WALK A LITTLE, LOSE A LOT
Drop 10 Lbs In 4 Weeks!
EAT YOUR WAY SLIM
7 Amazing Fat-Burning Foods
All-Natural Allergy Cure
It's True! See p.69
BREAST CANCER
Simple Ways To Slash Your Risk
Belly, Butt, Thighs!
TONE EVERY BULGE In Just 10 Minutes!
Zooey Deschanel
Her secrets to a sunny life
Health.com APRIL 2010
Gorgeous For Less!
83 Best Buys For Your Skin, Hair & Body

Model in the Article

1. Sky Reach-15 reps each side
2. Speed Intervals-10 sec at a moderate pace then 20 seconds at a fast pace for a total of 2 minutes
3. Bench Push-ups-15 reps
4. Walking Lunge-2 minutes
5. Tree Back Rows-15 reps
6. Speed Intervals (same as #2)
7. Jump Pull-ups-15 reps
8. Speed Steps-up and down stairs for 2 minutes
9. Hanging Leg Raise-15 reps
10. Speed Intervals (same as #2)





Drop 12 Pounds this Month

- Lose 5 pounds the first week
  - Å Consume 1200 kcal/day
  - Å Do the 10 exercises/day (total of 40 min)
- Five pounds/week=calorie deficit of ~17,500 calories or a daily deficit of ~2500 kcal
- Estimate her weight 100-110 pounds (~50 kg)
- Estimate the 40 min workout is an average increase of 4 times resting metabolic rate
- 1 MET=1 kcal/kg/hour
  - Å So, 4 x 50 X .66=132 kcal/workout
- Estimate PAL of 1.3 so 24 hour kcal expenditure would be 1560
- 1560 kcal-1200 kcal=360 kcal/day deficit=1 pound in ~10 days
- Somehow the math doesn't work

Summary

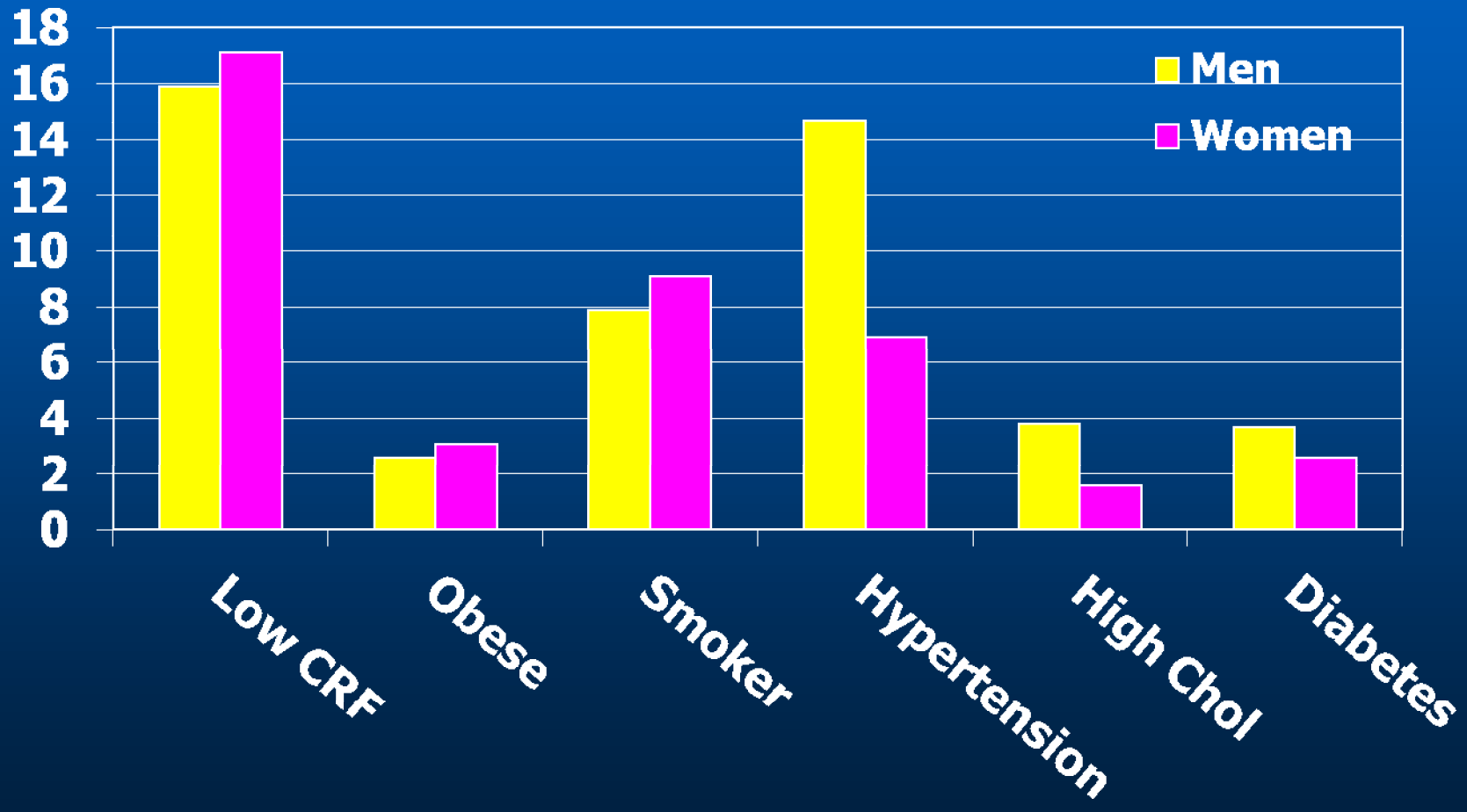
Attributable Fractions of Health Outcomes For Low Cardiorespiratory Fitness and Other Predictors, ACLS

- Attributable fraction (%) is the estimated number of deaths due to a specific characteristic
  - Based on strength of association
  - Prevalence of the condition

Aerobics Center Longitudinal Study, 1970-2004. In progress

Attributable Fractions (%) for All-Cause Deaths

40,842 Men & 12,943 Women, ACLS



Blair SN. *Br J Sports Med* 2009; 43:1-2.

We Should--

- Focus on
  - Healthful eating habits
    - Fruits and vegetables
    - Whole grain
  - Regular physical activity
    - Three 10 minute walks/day

Thank you
Questions?